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An Experimental Examination of Mesenteric Glands, Tonsils and Adenoids,

With Reference to the Presence of Virulent Tubercle Bacilli.

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THE experiments were primarily undertaken with a view to determine the presence or absence of virulent tubercle bacilli in the mesenteric glands of young children by an examination of suitable *post-mortem* material. The results, it was hoped, might furnish additional data with reference to the importance of the digestive tract as a channel for the entrance of tubercle bacilli into the system. The methods adopted were as follows:—The mesenteric glands on their removal at the necropsy were placed in a mixture of equal parts of glycerine and normal saline solution and conveyed to the laboratory. The material was tested in every instance by means of inoculation experiments. For this purpose a new method of procedure was adopted. The glands were freed as far as possible from the glycerine mixture, and were then disintegrated in a mechanical contrivance devised by Mr. Rowland for the purpose. It was considered that the method employed would facilitate the detection of the tubercle bacillus, and that it presented advantages over an ordinary emulsification, or a microscopic examination of the glands by the usual methods. If the organisms are sparse in number their physical presence may at times be overlooked. A thorough disintegration of the gland material will, on the other hand, tend to expose any organisms imbedded in recesses of the tissues and thus increase the chances of a successful inoculation experiment. In this respect the method appeared to us to approach more nearly to the conditions of an absolute test, and to be, therefore, the best adapted to the special purpose in view. The trituration of the glands was continued until the disintegration was so complete that a pulpy mass sufficiently fluid to be injected by means of a hypodermic syringe was obtained.

The disintegrating process lasted from half an hour to one hour, and every precaution was taken to carry it out under aseptic conditions, and to prevent any undue heating of the material. Of each gland thus treated, one half was injected subcutaneously, and the

other half peritoneally into a guinea-pig. At the end of six to eight weeks any animals which had survived that period were killed and examined. The results were only considered positive in those cases in which tubercle bacilli were detected by microscopical examination of the lesions present in animals.

The *post-mortem* notes of the cases were furnished by the pathologist who had made the examination, and our thanks are due particularly to Dr. Cecil Bosanquet, to Dr. Fennell, and to Dr. Nabarro, whose aid rendered the investigation possible.

The *post-mortem* findings and the general results of the inoculation experiments are contained in the accompanying table. It only, therefore, remains for us to give the inferences we have drawn from the results obtained. The total number of cases upon which the present paper is based is twenty-eight. We had hoped to increase the number, but unexpected difficulties arose in the way of procuring further material. The results, however, appear to be of sufficient interest to justify their being put on record.

The material examined was obtained as far as possible from cases of 5 years of age and under, as it is in such cases that a food infection would be most likely to occur. Only two cases were above 5—the one being about 6 and the other about 8 years of age. As regards sex, sixteen were males, nine females, and in three the sex was unrecorded. The examination for virulent tubercle bacilli was made irrespective of disease.

In none of the pathological reports was mention made of the detection of intestinal lesions. In the twenty-eight cases the *post-mortem* diagnosis was as follows: Acute miliary tuberculosis, one; general tuberculosis, four; tuberculous meningitis, two; tuberculous broncho-pneumonia, one; non-tuberculous or suffering from other diseases, twenty. There was, therefore, existent tuberculous disease in eight of the cases.

The animal inoculation experiments showed that virulent tubercle bacilli were present in the mesenteric glands in ten of the twenty-eight cases eighteen having given negative results. Of the eight cases diagnosed as tuberculous, five gave a positive and three a negative result. The positive results estimated upon the total number of cases examined amounted to nearly 36 per cent. If the cases diagnosed as tuberculous are eliminated, it will be seen that five of the twenty non-tuberculous cases contained virulent tubercle bacilli in the mesenteric glands, and that in these cases the positive results were equal to 25 per cent.

As regards the other glands of the body examined, the following results were obtained: The bronchial glands gave a positive result in one out of four cases examined—namely, a case of general tuberculosis. The tubercle bacillus was found in the mesenteric glands, and likewise in the cervical glands of the same case.

As regards the ten positive results obtained by inoculation experiments, the mesenteric glands were also examined microscopically in nine instances. Of the latter, in seven instances whilst the animal experiment was positive, the microscopic examination was negative.

TABLE.

No.	Sex	Age	Post-mortem Report	Microscopical Examination of Glands	Result of Inoculation
1	F.	14 mths.	Old empyema ; no obvious tuberculosis...	Negative	Negative.
2	F.	4 yrs.	Tuberculous meningitis	Negative	Positive.
3	F.	7 mths.	Empyema ; meningitis ; gut normal ...	Negative	Negative.
4	M.	7 mths.	Acute diarrhoea ; lobar pneumonia ; no intestinal lesions	Negative	Negative.
5	F.	6 mths.	Pertussis ; broncho-pneumonia	Negative	Positive.
6	M.	—	Broncho-pneumonia	Positive	Positive.
7	F.	9 mths.	Tuberculous meningitis ; scattered grey tubercles in lung ; caseous bronchial glands ; no caseous glands round abdominal aorta	Negative	Positive.
8	M.	2 $\frac{1}{4}$ yrs.	Multiple skin abscesses yielding staphylococcus pyogenes aureus only ; thrombosis of cerebral sinuses	Positive	Positive.
9	M.	1 yr.	Broncho-pneumonia ; no intestinal lesions	Negative	Negative.
10	—	1 yr.	Died suddenly ; no intestinal lesions ; <i>nil</i> found <i>post mortem</i>	Negative	Negative.
11	M.	4 $\frac{1}{2}$ yrs.	Acute miliary tuberculous	Negative	Positive.
12	M.	1 yr.	Tuberculous broncho-pneumonia	Negative	Negative.
13	M.	1 $\frac{2}{3}$ yrs.	Measles ; broncho-pneumonia	Negative	Negative.
14	M.	1 yr.	Broncho-pneumonia ; no tuberculous lesions	Negative	Negative.
15	M.	4 mths.	Broncho-pneumonia ; no tuberculous lesions	Negative	Negative.
16	M.	2 yrs.	General tuberculosis ; tuberculous meningitis	Negative	Negative.
17	M.	1 $\frac{7}{12}$ yrs.	Broncho-pneumonia ; no tuberculous lesions	Negative	Negative.
18	M.	15 dys.	Wasting ; jaundice ; no tuberculous lesions discoverable	—	Negative.
19	F.	6 $\frac{1}{3}$ yrs.	General tuberculosis	—	—
			Mesenteric glands	Negative	Positive.
			Bronchial glands	Positive	Positive.
			Left cervical glands	Positive	Positive.
			Right cervical glands	Negative	Positive.
20	—	1 yr.	Purulent cerebral meningitis	—	—
			Enlarged mesenteric glands	—	Negative.
			Gland from bifurcation of trachea	—	Negative.
21	M.	5 yrs.	General tuberculosis	Negative	Positive.
22	F.	Stillborn		Negative	Positive.
23	—	—	Septic meningitis	—	—
			Mesenteric glands... ..	—	Negative.
			Right bronchial glands	—	Negative.
			Left bronchial glands	—	Negative.
24	F.	8 yrs.	Mitral and aortic disease	—	—
			Adherent pericardium	—	—
			Mesenteric glands... ..	—	Positive.
			Right bronchial glands	—	Negative.
			Left bronchial glands	—	Negative.
25	M.	5 mths.	Intussusception	—	—
			Peritonitis	—	Negative.
26	F.	1 $\frac{1}{2}$ yrs.	Empyema ; septic meningitis	—	Negative.
27	M.	2 yrs.	Meningitis	—	Negative.
28	M.	4 yrs.	General tuberculosis	—	Negative.

The experiments have shown that in the non-tuberculous cases virulent tubercle bacilli were present to the extent of 25 per cent. The tubercle bacilli, it appears from these experiments, are present

much more frequently in the mesenteric glands than ordinary *post-mortem* examination would lead one to suppose.

One point of interest to which we would like to draw attention was the detection by us of the tubercle bacillus in the mesenteric glands of a stillborn child.

As regards the other glandular tissues examined—that is, tonsils and adenoids—the material was obtained as the result of operations for the removal of the enlarged organs, and our thanks are due to Dr. Lambert Lack and the resident medical officer at the Throat Hospital, Golden Square, for the material. The ages of the patients varied from 2 to 21 years, all but two being under 17, and the majority under 11. The procedure adopted was the same as in the case of the mesenteric glands. Only those cases were counted in which the inoculated animals lived from one to two months. We were enabled to obtain results from forty-four cases of adenoids and thirty-four cases of tonsils. As these tissues were diseased it is a justifiable presumption that their power of resistance to the invasion of organisms was lowered, and that if virulent tubercle bacilli were not infrequently present in the throat, they would be found more particularly in situations such as those examined. The results, however, obtained have been entirely negative. In not a single case were there any naked-eye signs of tubercle, nor were tubercle bacilli found on microscopical examination of the organs of the experimental animals. We may, therefore, conclude that there are not usually present in the tonsils and adenoids tubercle bacilli capable of conveying the disease to that most susceptible animal, the guinea pig. The virulent organisms found to be present in the tonsils and adenoids examined belonged almost entirely to the group of the micrococci.